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Economic Conditions
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General Business Conditions

TRADE and industrial reports have continued very favorable during the past month. A slackening in manufacturing operations is expected in May, marking the beginning of recession from the Spring peak, but the drop this year has been less than usual. The automobile and steel industries, among others, have turned in figures almost equal to April, and it seems evident that general business indexes such as that of the Federal Reserve Board, which rose from 93 in March to 100 in April (1923-25=100), will show another advance in May.

Mr. Alfred P. Sloan, Jr., President of General Motors, states that the Corporation's sales for May will probably equal the April figures, which were the highest in its history. Sales of other automobile manufacturers likewise are holding close to the Spring peak. Factory operations therefore show little falling off. Assemblies during May probably have not dropped much below the 500,000 mark (U. S. and Canada), which compares with 528,000 in April and 382,000 in May a year ago.

Moreover, field reports warrant the expectation that the decline in June will be moderate. The used car situation is accounted a weakness in some quarters, but there is much testimony indicating that used car sales have gained proportionately as much as new cars, and that while stocks are heavy the ratio to sales is not larger than last year. Mr. Sloan states that used car stocks of General Motors dealers have begun to decline.

If the automobile industry turns out 1,400,000 cars and trucks during the second quarter, as seems probable, its showing will be 14 per cent over the same period last year and the best in any quarter since 1929. This is unquestionable evidence not only of the great replacement market for automobiles, but of improved purchasing power all around. Moreover, the demand for motor cars is duplicated in some degree by demand for other durable goods of everyday use which people have done without during the depression; and a long line of these industries, including refrigerators and other household goods, electrical merchandise, and farm implements, are doing about as well as automobiles.

Steel Mill Operations Holding Up

Most of these industries use steel, and their orders, together with heavy tinplate buying and a moderate demand for railway and structural materials, have maintained steel mill operations. The Spring rise in steel lasted longer than usual; the peak was reached in the week ended May 2 at 71.2 per cent of capacity, according to the Iron and Steel Institute's figures, and thereafter to the end of May the decline was less than 4 points. Advances of $2 a ton in steel prices have been announced for third quarter delivery. Buying to take advantage of present prices should sustain operations during June, but a compensating recession in July is likely, due to needs having been filled.

Tire and rubber goods factories consumed more rubber in April than in any previous month in their history, and have continued at full speed in May. Cotton mills also were more active in April than early estimates, based on the unsatisfactory gray goods markets, had indicated; cotton consumption was the highest for the month since 1929, and curtailment in May evidently has been moderate.

Retail trade is substantially ahead of last year. In many cities the increase in department store sales has run from 10 per cent upward, and the largest mail order house in the four weeks ended May 21 reported sales 28.8 per cent greater, and larger than in the corresponding period in any previous year. These gains are not due to higher prices, for merchandise prices are not appreciably above a year ago, but to larger volume and demand for higher quality goods.

The Situation in Capital Goods

The foregoing makes it appear that people are spending as freely as their resources per-

mit, and undoubtedly this is the case. Some of the industries cited, or at least the efficient units in them, no longer give evidence of hard times; and it is necessary to turn to the low activity of the industries making capital goods, to the unemployment, and to the fact that a substantial part of the purchasing power supporting trade is derived from relief and other payments financed by the Treasury deficit, for a reminder that business is still in the depression.

The capital goods industries, whose markets depend upon the forward planning of other industries, are the chief victims of the uncertainty as to the future, and of the difficulties to which business is, or fears it will be, subjected. However, activity such as has been described in industries selling to consumers necessarily leads to purchases by them of industrial goods.

The automobile industry and others are buying machine tools, and tool orders in April equaled the peak of last August, when the motor companies were laying in equipment for their new models. The railroads are carrying more freight than since 1931, and their earnings in April were apparently the best for the month in six years. With all their difficulties the roads are buying more heavy equipment this year than since 1930. Orders for freight cars in May climbed again to around 10,000. To be sure, this is a modest figure by pre-depression standards, but there was almost none of this business a year ago. Traffic prospects for the Summer are good. The movement of coal up the Lakes, and ore down, will be the heaviest in a number of years.

Building contract awards during the first half of May were seasonally smaller than in April, in total and in the main classifications except residential, but the increase over a year ago, which was 71 per cent, continues satisfactory. In the automobile and other busy centers the growth of employment has led to a considerable rise of rents for small houses and difficulty in finding accommodations. This situation is already stimulating building and will do so increasingly.

The gains in the capital goods industries are measured upon a small base, and their contribution to the total business volume is still subnormal, but it is certain that the area of recovery has been broader this year than at any other time in the depression. It is significant that the most striking percentage gains in employment have been in heavy industries, including locomotives, shipbuilding, steam and electric car building, aircraft, and machinery.

Factors Affecting Sentiment

In view of the uncertainties aroused by the stock market decline and the French crisis in April, the reports from the industries have had a reassuring effect. There was reason to consider whether the drop in stock prices would affect trade, and even whether it portended a reversal of the upward business trend. Thus far, however, the reaction has been limited to the stock market itself.

In considering how far the improvement may carry, the important questions are, first, as to the psychology of business, in other words the will to spend and invest; and, second, whether relationships among costs, prices and other elements in the exchange of goods are approaching or falling away from the state of balance which is essential to prosperity. The willingness of consumers to spend is evident. Business men, under pressure of competition and obsolescence, are improving and modernizing plants, but are not generally inclined to carry out projects for meeting future needs. Their caution restricts business, and fear of the growing tax burden, and of renewed regulations and restrictions that will increase business difficulties and penalize enterprise, is the chief obstacle to recovery. However, the prevalent conservatism may be the best guarantee against a setback. Business is overcoming present difficulties, and unless it has to face new ones capital goods activity is more likely to increase then diminish.

There is no reason for thinking that relationships among the elements in the economic system are changing for the worse. Consumer income is rising more rapidly than the cost of living. The increase in manufacturing payrolls in April over a year ago was 10 per cent and farm income was 3.5 per cent higher, while the cost of living was up only 1.2 per cent, according to the National Industrial Conference Board's index. The increase in farm income was derived entirely from marketings, as Government payments were slightly smaller. Moreover, it was due to the marketing of a larger volume of farm products, which were sold at lower prices. Of course both the farmer and the city people are the gainers, the farmer by reason of his greater money income and the city man by his ability to buy more food or other goods for the same money. The farmer also is paying less for the feed and seed he buys, and for some industrial products such as fertilizer. Less of his income is going for debts and taxes, and the payments he receives from the Government will be heavy all year.

Farm Prices Easier

Although the farm purchasing power is not in question, the declining trend of farm prices has attracted some attention. The farm products group of the Bureau of Labor Statistics price index on May 16 was 74.4, compared with 80.9 a year ago, and this is the lowest since December, 1934.

Cattle and hog prices have been declining on the seasonal increase in receipts, which are running considerably heavier than a year ago. The prices of both cattle and hogs are expected

to ease in the Spring, but the decline in cattle has been unusually large and in hogs less than usual, hog prices remaining higher than last year despite the increased supplies. The production of milk, butter, cheese and eggs is running considerably greater than last Spring, and these products are being taken off the market at good prices, demonstrating the influence of city buying power upon farm income. Grains have eased during the month on more favorable crop reports, as badly needed rains occurred in the drouth section of the Southwest. The Government Winter wheat estimate on May 1 was only 464,000,000 bushels but the prospect appears to have improved during May. The Spring wheat belt needs moisture but the crop is in good shape.

The cotton market has been supported by an unfavorable crop start, with rain badly needed in the East and sub-soil moisture deficient in the West. A poor start may mean little in the long run, but it has put observers on their guard against over-bearish interpretations of the outlook. The cotton statistics have taken a turn for the better during the past few weeks; both domestic consumption and exports are running above expectations. Undoubtedly this is due to the policy of the Government in releasing a part of its stock, thereby averting a scarcity of desirable grades and staples. About one million bales of cotton on which the Commodity Credit Corporation has loaned 12c a pound is being returned to the farmers at prices ¼ cent below the current market, but not lower than 11¼c. This enables farmers to sell their cotton when the market price is 11¼c or better, and to liquidate their loans. The Government absorbs the difference between the price at which the farmers take it over and 12c, and also accumulated the carrying charges.

This method of disposal causes a loss to the Treasury which may average 2c a pound, but this is the cheapest way of extricating the Government from its untenable position without wholly disrupting the cotton market and the textile industry. Doubtless the Government could have "squeezed" the market to a price where it would incur no loss, but if it had done so consumption would have been seriously affected. Moreover, the artificial price would have played into the hands of the foreign growers who are competing with this country.

Cottonseed oil has been among the weakest of all the farm commodities. Consumption this season has hardly reached expectations, although it will be larger than production, and the carryover on August 1st next will be perhaps 300,000 barrels less than a year earlier. The market is looking ahead to the increased supply of lard, accompanying the expected rise of 20 per cent in the hog slaughter during the late Spring and Summer. Even though supplies of edible fats promise to increase, however, they are still subnormal and cannot recover pre-depression levels for another year or more.

The declining trend of farm prices invites a comment on the effectiveness of the monetary measures taken for the purpose of raising prices. As long as the capacity to produce is not fully used, the ordinary factors of supply and demand will operate in the markets, and "inflation" in the sense of rapid price advances accompanied by a feverish turnover of money cannot be expected to develop. Inflation in this meaning is a condition which arises after the productive mechanism is operating at capacity, from making demands upon it greater than it can meet, as during the war. In that situation an increase in the supply of money can only dilute its purchasing power, i.e., start the endless circle of price and cost increases. The surplus of unused productive capacity both on the farm and in the factories, and the unemployed labor, supplies the chief reason why a price rise of that character has not developed. The situation illustrates the limitations, to say nothing of the dangers, of monetary formulae for price raising.

Gains in Foreign Trade

Domestic business expansion has been accompanied by moderate foreign trade gains, but the foreign trade figures have attracted attention this year chiefly because imports have exceeded exports in three of the four months reported. For these four months imports were 17 per cent in value over a year ago and exports 12 per cent higher. The excess of imports was $12,400,000, compared with an export excess of $21,200,000 a year ago.

Larger factory production naturally requires greater imports of raw materials and our purchases of wool, hides, furs, wood pulp, oils for soap making, jute and other fibres have increased. Food imports in the four months were lower or unchanged, with the exception of wheat and sugar which were higher. Imports of corn and other feeds, following the abnormal increase a year ago due to drouth, dropped off again. Imports of whiskey and spirits rose sharply on the cut in the tariff. The total volume of imports is close to the 1925-28 average and only 15 per cent below the 1929 peak.

This buying is one of the reasons for improvement in other countries, which in turn buy more from us. Sugar, our second largest import item, affords an example. Sugar imports from Cuba in the first four months reached the value of $47,000,000, almost twice as much as in the same period last year. After almost a decade of acute depression and political and economic readjustments Cuba now shows signs of all-around improvement. Accordingly the island has increased its purchases from us by a substantial amount since the trade agreement reducing tariffs began to operate.

Among exports of agricultural products only cotton, tobacco and fruits show increases, but exports of oil, chemicals, machinery of all kinds, refrigerators and particularly automobiles have made impressive gains. Shipments of automobiles in the four months were more than 32 per cent over last year, and in March, alone passenger car exports were greater than in the full year 1932.

The fact that imports exceeded exports during the period should cause no concern. The increased imports are beneficial both to this country and the shipper. The commodities named have been brought in to satisfy needs, chiefly because the United States does not produce the quantities or qualities desired. The shippers who have sold them to us have American dollars, which in last analysis will be spent here either to buy American goods or to pay debts, for the advantages of trade are mutual. To be sure, if the dollars are not needed to make payments here they can be converted into gold and the gold withdrawn (provided it goes to gold standard countries); but there need be no apprehension that normal merchandise trade will lead to any substantial gold exports. The huge receipts of gold by this country in the past two years have been due chiefly to transfers of capital from other countries to the United States, for investment or security, and the gold is not likely to be lost until the capital is withdrawn.

World Trade on Upgrade

To what extent increased European purchases of our products are influenced by normal industrial needs, and to what extent by "rearmament booms", is a question. In Great Britain and the Scandinavian countries, however, business improvement has continued, and the countries producing industrial raw materials and foodstuffs have made futher progress on the road to recovery and in expansion of purchasing power. The ready sale of the wool crop at higher prices, and the growing importance of butter, meat and miscellaneous food exports, has brought the value of Australian exports once more to 1929 levels. New Zealand, Uruguay and other wool producing countries have also made a substantial progress. A comparison of recent export figures with those of 1932 or 1933 shows striking changes. The value of exports of South Africa, Mexico, Peru, British Malaya, Chile and Colombia has doubled. Argentine exports, after improving substantially, have fallen somewhat this year due to smaller crops, but the decline will doubtless be temporary and in no way retard the country's economic revival.

Also, the raw material producing countries have been buying a great deal more. Imports of South Africa, benefiting from higher gold prices, have trebled. With basic needs better satisfied, these countries have been turning to the importation of automobiles, refrigerators, quality goods of various types and luxury articles, to such an extent that Chile has placed temporary restrictions, and Australia has raised tariff rates, upon certain luxury items. On the whole, however, the returning prosperity facilitates relaxation of the trade and exchange restrictions which are still handicapping business. It is unfortunate that domestic improvement in some cases leans considerably, and perhaps precariously, upon Government expenditures, export subsidies, and the like. However, the facts as to trade improvement are indisputable.

Money and Banking

The past month has witnessed a further growth of both gold stocks and bank reserves. The growth of gold stocks has been mainly on account of gold imports which have lifted the total gold holdings of the country to a new peak of $10,388,000,000. For the first 28 days of the month gold imports amounted to $155,-000,000, of which $126,000,000 came from France, and the balance chiefly from India and Holland. The gold from France was part of an export movement from that country which developed in March following the reentry of German troops into the Rhineland and which has continued during the period of French election uncertainties. While most of the early losses were to London, gold purchases in Paris for shipment to the United States have amounted altogether to $150,000,000 since April 24, of which $126,000,000 has been received.

The following table shows the increase in the country's monetary gold stock over the past year, and the extraordinary changes that have taken place extending back to before the war. (Figures as of each year-end, except for 1935 and 1936).

Monetary Gold Stocks of the United States
(Millions of Dollars)

Valuation $20.67 an ounce	
1913	1,290
1918	2,658
1929	3,900
1930	4,225
1931	4,051
1932	4,045
1933	4,012
Valuation $35 an ounce	
1934	8,238
1935, end of May	8,858
1936 " " "	10,388

Bank reserves continued to recover during the month from the levels to which they had been reduced in March when income tax collections and cash subscriptions to new Treasury issues caused a piling up of funds in the Federal Reserve Banks. As gold has come into the country, the commercial banks receiving it have sold it to the Treasury, and deposited the proceeds to their reserve accounts in these central institutions. Also, disbursements by

the Government of a portion of its balances accumulated at the Federal has tended to replenish commercial bank reserves. Inasmuch as the legal reserve requirements, based on deposit liabilities, failed to increase in the same proportion, excess reserves rose to $2,900,000,000, or within $400,000,000 of the all-time peak reached last December. And on May 27 the Treasury still had nearly $550,000,000 on deposit with the Reserve Banks which presumably sooner or later will come back into the market.

With the supply of funds so large, money rates have continued very low. Rates for call and time loans on Stock Exchange collateral advanced fractionally to 1 per cent for call money and 1¼ per cent for time money up to six months. Yields on new issues of Treasury bills likewise increased slightly, apparently reflecting the stepping up of the regular weekly sales from $50,000,000 to $100,000,000, the extra $50,000,000 to mature December 15 next. On May 27 the regular offering of $50,000,000 273-day bills was discounted at an average rate of 0.2 per cent, compared with 0.089 per cent a month previous and 0.074 per cent at the year's low in February; the offering of 202-day bills maturing next December was discounted at 0.175 per cent.

Effects of June 15 Financing and Bonus Payments

Of interest in connection with money market prospects is the heavy volume of Treasury financing scheduled for June 15 and subsequent payment of the soldiers' bonus. Treasury financing has been announced to a total of something over $2,000,000,000—a peace-time record—of which $1,000,000,000 will be new money and the balance refinancing. If the experience of the December and March financing operations is repeated, the first effects of the sale of new securities on the 15th will be a sharp drop in the reserves and deposits of the commercial banks as funds to pay for the new issues are checked into the Reserve Banks acting as fiscal agents of the Treasury. Later, as these funds are paid out by the Government in discharge of bonus and other obligations, both reserves and deposits will again increase. Should the Treasury at that time pay out all its balances at the Reserve Banks, including the $550,000,000 now on deposit, the effect would be to carry excess bank reserves to new high levels. This, however, does not appear to be likely as the Treasury is reported to be averse to seeing excess reserves increased unduly beyond present levels, and to be planning to so arrange its payments as to cause a minimum of disturbance of the present situation. This it can easily do by continuing to carry a substantial balance in the Reserve Banks, and paying its bills by drawing on its balances in the commercial banks.

It should be understood, of course, that over the long run Treasury borrowing from the banks tends to reduce the quantity of excess reserves. This is contrary to the impression held by some people that the present huge excess reserves have been created by Treasury deficit financing. The reason why Treasury borrowing reduces excess reserves is that it creates deposits against which reserves have to be kept. In other words, the effect of such borrowing upon the market is no different from that of any other borrower of similar magnitude. It tends to reduce the quantity of funds which the banks have for further lending. Excess reserves have grown large over the past few years because of gold imports, the issuance of new money in connection with Treasury silver purchases, and, prior to 1934, the purchases of Government securities by the Federal Reserve Banks.

Trend of Bank Credit

Among the banking changes of the past few months may be noted some slight indications of an increased demand for bank credit, although the amount is still small in relation both to normal demand and to the huge quantity of funds available. Herewith is presented a chart showing the monthly trend of loans as distinguished from investments of the weekly reporting member banks for 1932 to date. It will be noted that this Spring, for the first time since 1933, loans have exhibited a rather pronounced uptrend. While the extreme low points were touched in July and August last year, the increase was very gradual during the Fall and Winter.

Of the increase registered this Spring ($376,000,000), about a third was in loans on stocks and bonds, and about two-thirds was in "other loans," generally considered roughly indicative of commercial borrowing. The latter rise was no doubt at least partly seasonal; nevertheless, it was considerably more than occurred in the same period last year, and the total of these loans is about $181,000,000 greater than a year ago.

Another evidence of an increase in the demand for money, though in a different field, appears in the figures of new capital issues. These show that during the first four months of this year the volume of corporate financing, exclusive of refunding, amounted to $273,000,000, compared with $42,000,000 in the corre-

sponding period of 1935, $61,000,000 in 1934, $44,000,000 in 1933 and $149,000,000 in 1932.

All this, of course, is significant chiefly as revealing a trend, the actual increases, as stated above, being relatively small. Compared with 1929, when the volume of credit engaged in carrying securities was very large, loans still show a shrinkage of approximately 50 per cent, while the present rate of corporate financing involving new capital has been less than 10 per cent of that in 1929. However, if business expansion continues, it is reasonable to suppose that the demand for credit and capital will also gradually increase.

Bond Market and New Issues

The market in Government bonds was rather irregular during May. Around the middle of the month certain of the long-term Treasury issues advanced to new high quotations, after which the market indicated some adjusting on the part of banks, dealers and corporations for the purpose of putting their houses in order for the large new issues to be offered this month. At the high points, the Treasury 2 3/4s due in 1954/48, which were issued last March, sold at 102 13/32, giving a yield of 2.52 per cent, while the Treasury 2 7/8s of 1960/55 sold at 102 11/32, giving a yield of 2.70 per cent.

High grade corporate bonds, as well as municipals, have continued firm during the past month. New offerings of prime credits have met with an excellent reception, and the condition of indigestion in the placing of new issues, which was noticeable at times during recent weeks, has been alleviated somewhat.

As an indication of the low levels to which interest rates on prime capital obligations have fallen the following table is presented. Included in the table are a number of important new bond issues selected from among the primer offerings and representing different types of bonds (industrial, telephone, railroad, etc.). The corporate issues included were all for refunding purposes.

Borrower		Amount	Price	Yield
Standard Oil Co. of N. J. 3s,	1961	$85,000,000	98	3.11
B'klyn-Edison Co. Inc. 3¼s,	1966	55,000,000	101½	3.165
Pacific Tel. & Tel. Co. 3¼s,	1966	30,000,000	101½	3.18
Cin. Union Terminal 3½s,	1971	24,000,000	102½	3.37
Un. Pacific R.R. deb. 3½s,	1971	26,835,000	99	3.55
City of Cincinnati, O. 2-2¼s,	1961	1,700,000	—	2.15-.25
City of Rochester, N.Y. 1½-2s,	1941-56	2,622,000	—	2.10
State of Maryland 3s,	1951	1,500,000	—	2.00
State of Vermont 1¾s,	1947	1,500,000	—	1.75

Inasmuch as the interest received from corporate bonds is subject to income taxes of 15 per cent at present for corporate holders, and at a proposed rate of 18 per cent, the yield on some of these bonds, after deducting taxes, is lower than the yield on Treasury bonds which are tax exempt for corporate holders.

Problems of the Coal Industry

Two important developments during the past month affecting the coal industry have again focused attention upon the unusual difficulties under which this major industry has been operating ever since the war. The first was the settlement of a threatened strike by the preparation of a new wage agreement between the anthracite operators and miners, renewing the old contract but providing for a number of modifications, including the establishment of a 7-hour day next year at the same wages now paid for 8 hours; the second was the Supreme Court decision that the Guffey law (Bituminous Coal Conservation Act) was unconstitutional.

As in the case of many other industries, the origin of the trouble with coal mining goes back to the war, which caused a large increase in the demand for coal for domestic use and for export, together with a marked rise in coal prices. This naturally stimulated an increase in coal production, by speeding up output and expanding the capacity of existing mines, and also by opening up new and higher-cost mines where the higher prices prevailing offered an opportunity to operate profitably. There were substantial wage increases for all classes of work during the period 1917-1920 and the 8-hour day, which by 1916 had already been adopted for about 60 per cent of the workers, was established for practically all of the others who had previously been on a 9 or 10-hour day.

Following the war, the abnormal demand subsided. Prices of coal dropped sharply from the 1920 peak but remained about twice as high as before the war. Further price reductions were limited by the new scale of wages, the largest element in costs, and the high costs made it easier for business to be taken away from the coal industry by competing sources of power and heat such as fuel oil, natural gas and water power. Not only did coal contribute a diminishing share of the total supply of energy produced in this country, but because of the marked improvement in the efficiency of boilers and engines, a continually decreasing amount of coal was required to produce the same energy.

The inevitable consequence of this shrinkage in markets was that the over-expanded industry was forced to operate at greatly curtailed rates, employment was irregular and the financial results to most owners of coal properties, and to all persons dependent on the industry, were disastrous. The miners opposed any reduction in wage rates and there have been repeated strikes and other labor troubles, causing a large loss of working time to the workers and heavy losses to the operators. Although wage rates were relatively high, the amount of wages actually received by the individual worker during a year was much lower proportionately, due to the idle time. This situation was of no benefit to the operators, whose pro-

duction costs are determined by wages paid per hour or per ton of coal produced.

Earnings in the Coal Industry

In view of the recent agreement on wages in the anthracite field and the decision on the Guffey law, a review of the earnings in the coal mining industry is pertinent. Following is a condensed table, compiled from the annual Statistics of Income issued by the Treasury Department, showing from the year of the first report (1916) to the latest (1933) the total number of corporations and the percentage reporting a profit each year, the gross income, federal taxes paid, and net income after taxes and after deficits. The percentage of net to gross income is also shown.

Earnings of All Coal Mining Corporations in the United States (Bituminous and Anthracite)
(In Thousands of Dollars)

Year	Total§ Number	Reporting Profit-%	Gross Income	Income Taxes	Net Inc. After Tax	% Net to Gross
1916...	2,698	68.1	$ 760,229	$ 2,399	$ 99,962	13.1
1917...	*	*	*	*	*	*
1918...	3,129	69.0	1,828,290†	76,961	94,315	5.2
1919...	3,228	48.9	1,525,543†	17,701	57,692	3.8
1920...	3,673	81.0	2,564,185†	107,048	238,925	9.3
1921...	3,656	29.5	1,652,289†	15,219	D-5,086	D-0.3
1922...	4,110	60.0	1,548,520†	15,633	94,976	6.1
1923...	3,872	35.9	2,021,408†	15,430	61,927	3.1
1924...	3,516	23.6	1,539,857†	5,554	D-53,419	D-3.5
1925...	3,767	29.2	1,133,483	5,587	D-27,995	D-2.5
1926...	3,679	36.7	1,633,624	10,647	27,067	1.7
1927...	3,131	34.7	1,417,319	7,765	D-28,067	D-2.0
1928 ..	2,831	32.4	1,299,916	5,120	D-24,377	D-1.9
1929...	2,580	37.5	1,308,243	5,280	D-14,160	D-1.1
1930...	2,348	34.9	1,190,261	3,907	D-37,869	D-3.2
1931...	2,187	28.1	971,734	1,661	D-51,020	D-5.3
1932 ..	1,971	16.3	735,895	983	D-68,847	D-9.3
1933...	1,986	22.1	781,908	1,472	D-59,878	D-7.7
Total 1916-33	3,080‡	40.5	$23,912,704	$298,367	$304,146	1.3
Total 1921-33	3,049‡	32.4	$17,234,457	$ 94,258	D-186,748	D-1.1

* Not reported. D- Deficit. † Total value of coal produced, as reported by the Interior Department, Bureau of Mines, is used in place of gross corporate income, which was not given in the Treasury Department Statistics of Income for these years. §Excluding inactive corporations. ‡Average number.

Taking the entire period, it will be noted that, on an average, only 40.5 per cent of all coal mining corporations operated at a profit while 59.5 operated at a loss. Since 1920, the number operating at a profit has averaged only 32.4 per cent of the total, leaving 67.6 per cent that ran at a deficit. The industry as a whole has had a deficit each year since 1920, with but three exceptions, and many companies have preferred to continue operations at a loss rather than close down.

Over this period the gross income of all coal mining corporations (or total value of coal produced in years stated) aggregated approximately $23,913,000,000 while the net profit was $304,000,000 or but 1.3 per cent of gross income. This means that $23,609,000,000 or 98.7 per cent of gross income received was paid out in wages and salaries to miners and other employes, or paid for materials and supplies, taxes and interest, rents and royalties, or charged to depreciation and depletion. Dividends paid to shareholders are not reported, but taking the industry as a whole, any such dividends since the war obviously were not earned, but were paid out of capital.

It is interesting to note that for the period 1916-1933, the industry paid out in federal income taxes alone approximately as much as its net earnings after taxes, and the addition of data for the years 1934 and 1935 would make the showing worse. Moreover, this tax bill does not show the heavy state and local taxes that are levied upon the coal properties each year, regardless of whether or not the companies are making any net income.

The above financial summary, as well as the record of representative individual companies reporting operating losses, write-offs, receiverships, reorganizations or liquidations, indicates the staggering dissipation of capital that has taken place in this major industry during recent years, and that is still going on. While the Statistics of Income do not show the amount of corporate capital invested in this industrial group, the trend may be seen from the following figures taken from the published balance sheets of twenty leading corporations:

Capital and Surplus of Twenty Leading Coal Mining Companies
(In Thousands of Dollars)

	Combined Total	"Average" Company
December 31, 1925	$610,969	$30,548
December 31, 1930	504,906	25,242
December 31, 1935	349,713	16,485
Change 1925-1935		
Amount	—261,256	—13,063
Per Cent	—42.7	—42.7

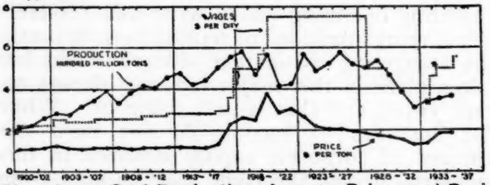
In the past ten years, the combined capital and surplus of this group of representative companies, including several that have done relatively well, was cut from approximately $611,000,000 to $350,000,000, a reduction of $261,000,000 or 42.7 per cent. Expressed as an "average large-sized company," the capital and surplus was $30,548,000 ten years ago and had shrunk to $17,485,000 on December 31, 1935.

Trend of Production, Prices and Wages

The problems of the coal industry have been given a great deal of study and investigation during recent years by the industry itself, by the Federal Government, the State Governments and by various other organizations. Most of the efforts that have been made toward putting the industry on a sound basis have failed because of the excessive capacity of the industry, the excessive number of workers who are attached to it, the competition from other types of fuel and power, the improved combustion efficiency, the lack of agreement within the industry as to what should be done, and particularly the fact that these efforts did not provide for a lowering of costs.

An agreement such as that just signed in the anthracite field, providing that next year the wages paid for a 7-hour day shall be the same as now paid for an 8-hour day, which is equivalent to an increase of 14 per cent in hourly wages, does not solve the problem of reducing costs. Likewise, the Guffey law, providing for the regulation of the bituminous fields through a system of taxes upon the production of coal, had the basic weakness, even if the Federal Government had been granted the power to control industry, of keeping the price of coal up, instead of lowering production costs and prices to the consumer so as to expand volume and possibly to recapture some of the business that has been lost.

The trend of coal production, prices and wages since 1900 is shown by the following diagram:



Bituminous Coal Production, Average Prices and Basic Daily Wages in the Hocking Valley, Ohio, District.

***Hours cut from 8 to 7, and basic daily wage increased at same time.**

In the years preceding the war, production of bituminous coal followed a strongly upward long-term trend; wage rates were around $2.00 for an 8-hour day and the price of coal at the mines was slightly over $1.00 per ton. After 1920, the upward trend of production was checked and the annual output averaged around 500,000,000 tons, then declined substantially down to 1932, reflecting the general business depression, and has since recovered somewhat. Average prices of bituminous coal, at the mine, have declined materially in recent years but are well above the pre-war price, while the retail prices are still higher due to the increase in railroad freight rates (which to many consuming centers are more than the cost of the coal itself) and other costs of distribution.

No statistics as to average wages in the entire coal mining industry are available in a continuous series going back to before the war, and wide variations will be found from any "average" because of the difference in wage scales paid for different types of work, also for different territories, and even for different companies in the same territory. The basic daily scale of rates paid in the Hocking Valley, Ohio (bituminous) district, which has been compiled by the Department of Labor since 1892, is given on the chart to indicate merely the general trend of wages.

Further comment on the effects of the Guffey law decision is given in the following article on "Wealth and Its Distribution".

Wealth and Its Distribution

In an article under the above heading in the March number of this Letter, we told the story of Boulder Dam and the part played in it by chemistry and engineering. Supplementary information is now given in the following pages.

First, is a description of the Power Line, that carries the current from the Dam to Los Angeles. By way of introduction to this we submit a bit of information about the Pearl Street station of the New York Edison Company, established in 1882. Writing of this station for an article six months ago, this question arose: Why, in view of the fact that electricity was to be generated by burning coal, was the plant located at Pearl Street instead of on a waterfront, where coal could be had at lower cost, and water also?

We put the question to Mr. George A. Orrok, the eminent engineer, an associate of Mr. Edison in the early years of the enterprise, and long on the staff of the Edison Company. The essential portion of his reply is given herewith:

At the time that Mr. Edison designed and located the Pearl Street Station he knew very well the advantages of water borne coal and condensing water, but he was faced also with the fact that it was not possible at that time to distribute electricity more than three-eighths of a mile from the generation station without a very extensive cost for copper in the streets. He looked around for a water front property which would be available near the Wall Street district, at that time his projected load, but due to various circumstances, among which was the price of real estate and the high price of copper, he finally picked on Pearl Street as the proper location, as near to the center of load as possible.

At that time, he had not invented the three wire system and the earlier distribution system from Pearl Street was of the two wire variety. After Pearl Street had been running about a year his three wire conception was invented, saving thereby 65% of the copper in the streets and enabling distribution to extend more than three-quarters of a mile from the generating station. We since, by our combination of alternating and direct current, by our increase in voltage of the feeder lines, are able to work economically 20 or 30 miles from a generating station and at a small increase of cost to perhaps 100 miles. I am not yet sure in my own mind that 200 mile or 300 mile transmission ever pays.*

Electrical Development

In previous numbers of this series we have briefly sketched electrical development. The existence of electricity had been vaguely known for a long time before it was controlled in a current. The first use was for lighting by means of the arc, which had been discovered long before, by Sir Humphrey Davy, inventor of the miners' safety lamp, but was first utilized commercially by Charles F. Brush, by means of a dynamo perfected in 1876. He founded the Brush Electric Company, of Cleveland, which acquired the patents. In 1878 Elihu Thomson of Philadelphia, with the aid of E. J. Houston, obtained patents upon a number of

***Note: Mr. Orrok was writing of the relative costs of generating and transmitting power under ordinary conditions, with no other consideration present. In the Boulder Dam development important additional considerations were present, in control of the river and conservation of water supply.**

inventions which soon made the Thomson-Houston Company an active competitor in the production of current for arc-lighting. Thomson played a large part in early electrical development, receiving over 600 patents, many of notable importance. He was the first recipient of the Edison medal-award, later established by the American Institute of Electrical Engineers, for important discoveries in electrical science. Brush received this in 1913.

Notwithstanding these developments in arc-lighting, well-suited to outdoor use, the electrical industry did not get its big start until Thomas A. Edison perfected the first commercially-successful incandescent lamp, and almost simultaneously announced his inventions of an efficient generator and motor and a distributing system on the multiple-arc principle, all in the year 1879. His new generator attained an efficiency more than 100 per cent above any previously in use. The incandescent lamp quickly became popular for interior lighting and the industry grew rapidly. Two years after the establishment of the Pearl Street station, the Edison and Thomson-Houston Companies were consolidated under the name of the General Electric Company, becoming at once the largest organization for producing electrical equipment in the world. Mr. Thomson became associated with General Electric as a technical adviser and the connection has been maintained to this day.

When the Pearl Street station was established, the area of distribution was limited, as we have seen, by the transmission problem, which required a multiplication of plants and made the current costly. Copper was the best conductor, and as early as 1848, Thomas Wallace & Sons began drawing copper wire at Birmingham, Conn., and subsequently built a factory at Ansonia, which has been in operation ever since. The first copper wire was made by slitting a rolled sheet and then drawing the strip through a series of single dies. In 1884, the first continuous wire-drawing machine was installed, likewise in Ansonia.

As the "load" on an electrical system increases greater carrying capacity is required of the conductor, and in response to this demand, the first cable-making machine in this country was installed at the Ansonia mill in 1892. Also in 1892, the first paper-insulated cable in the United States, was fabricated at the Hastings-on-Hudson mill of the National Conduit & Cable Company, a predecessor of the Anaconda Wire & Cable Company. Cables of this type have aided in the efficient distribution of electrical energy in large cities. They are used almost universally in transmitting high voltages, underground and in high buildings.

It was found that more current could be carried at a high voltage than at a lower, but since it would be impracticable to use the current in consumption at high voltage it must be transformed, or "stepped down," to a proper degree for use. This presented serious difficulties, which eventually were overcome, largely by the adoption of the alternating current system. Although numerous persons in this country and Europe, have contributed to make this system what it is today, William Stanley of the United States is credited with making it a practical success, in 1885. The fiftieth anniversary was celebrated by engineering societies last year. Following this came the induction motor invented by Nicola Tesla (1888). Tesla was a young Croatian engineer, technically educated in Europe, who after arrival in this country was first on the Edison staff, but soon after set up for himself.

Increasing size of generators, with the steam turbine engine, and the resulting high voltages, increased the area of distribution from a single station and effected important economies allowing the price of current to be reduced, thus greatly stimulating the growth of the business.

However, as voltage and current are increased above a certain relation to the diameter of the cable, the current tends to concentrate near the surface, and to escape outside, which means a loss of power. An increase of diameter tends to lessen this loss, but an expert calculation is needed to balance this saving against the increased weight of copper, also taking account of the required current-load. In some cases a steel core is used in the cable, which gives an increase of tensile strength, but of course has weight. Another resort is to a hollow cable, with or without interior supports, and in some constructions a hollow core is filled with oil. Hollow cables of different types have been in use in this country since about 1924.

The Boulder Dam—Los Angeles Line

We are indebted to the officials of the General Cable Corporation, manufacturer of the cable, for the following authentic description of the Line:

The line was designed, constructed and is to be operated under the personal direction of Dr. E. F. Scattergood, Chief Electrical Engineer and General Manager of the Bureau of Power and Light of the City of Los Angeles, and the conductor was manufactured by the General Cable Corporation in its new Los Angeles plant. Aside from the many problems connected with routing the line over desert and mountain, erection of gigantic steel towers 144 feet high, and provision for protection against lightning, the cable itself presents a novel feature in design.

Two parallel lines will bring power over the 271 miles between Boulder Dam and Los Angeles. These lines are outstanding in two main characteristics: 1. They represent the world's highest voltage use of electricity; 2. They carry the base load of a city of 1,250,000 people.

It is generally the case that long distance, high voltage, transmission lines interconnect various electrical systems to take advantage in diversity of load, or to bring hydro-electric power into a system which is well equipped with steam power. In such instances an interruption to service, while undesirable, is not very serious, but the City of Los Angeles has only a small amount of hydro power developed in connection with its aqueduct, and the Boulder Dam supply is to be the big bulk of the city's power supply, hence service interruptions would be very costly and dangerous. The combination of the unusual demands for continuity of service with a voltage higher than ever before used, has led to many important innovations in this line.

General Description of the Line

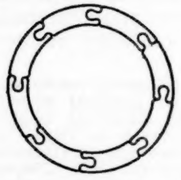
The lines run from Boulder Dam across the Mojave Desert through hot, flat desert in spots, and over high mountain passes, reaching almost a mile in height, at several places. Finally they cross through Cajon Pass down into the fertile plain of California and skirt the foot-hills from there into the city. At the one-third and two-third points are enormous switching stations, so if any section of the line shall have trouble it will be automatically switched out in a few hundredths of a second, the remainder of the line being able to carry the entire load. Each line can carry continuously about 120,000 kilowatts, or 240,000 kilowatts for the two. Starting from the Dam, the two circuits are carried on separate towers, the tower lines being about 350 feet apart, so that it is almost impossible for lightning to hit both circuits at the same time.

The Cable Itself

The problem of transmitting great amounts of electric power has been to achieve delivery of the power at its destination with the least loss in transit and with maximum economy in over-all cost of the line. In overhead transmission, the economy of high voltages can be utilized to better advantage. As voltage goes up, the amount of metal conductor necessary to carry the current comes down, thus the cost of conductor is lessened, and there is a consequent economy in the construction of carrying towers. High voltages, however, cause a glowing along the conductor surface, called "corona," which signifies a loss of electrical energy into the air, and a waste of power. Prevention of this calls for a conductor of relatively large diameter, and the problem was to combine, in a copper conductor, both lightness in weight and adequate diameter. The highest voltage heretofore used in actual service has been 230,000 volts.

Engineering calculations found that this line should be operated at 287,000 volts, that the conductor should be 1.4 inches in diameter with a cross section of copper of 500,000 circular mils. The cable chosen for the purpose is known as General Cable Type HH Hollow Conductor, which in appearance is a hollow copper tube of strong but flexible segmental construction and entirely without internal support of any kind. It weighs but 1.57 pounds per foot.

The former cable construction of twisted wires to that diameter would have required three times this amount of copper. This result was accomplished by departing from the old form of round wires of which cables are composed and using flat strips with a tongue on one end and a groove on the other, the strips being twisted together and tightly locked by the tongues and grooves. There was thus formed a thin tubular shell of copper as shown below.



The hollow tube construction in this case saved millions of pounds of copper over the old solid cable. Due to its tubular design its surface approaches a smooth cylinder, which results in the lowest "corona" loss yet developed. In addition it has unusual characteristics of stability and resistance to dangerous vibration in the wind. Approximately 1650 miles of this conductor, involving the use of 14,000,000 pounds of refined copper, will carry electric energy from Boulder Dam to Los Angeles.

The Towers and Fittings

The towers, each one of which contains 19,000 pounds of steel, are unique in their extreme height and other dimensions. There have been higher towers for special river crossings or other special cases, but nothing approaching these for a line under ordinary conditions. The single circuit towers are 109 feet high, and the double circuit towers 144 feet. One element which is particularly impressive is the cross-arm which holds up the three cables in the single circuit towers, being 65 feet long, thus providing 32½ feet of air insulation between the conductors. Another innovation is the fact that the legs of the tower are rotated 45 deg. from the usual position, thus enabling maximum economies in design to meet the extreme conditions of high transverse winds.

One of the main problems of any transmission line is to avoid fatigue of the metal at points of support due to vibration caused by light winds. Not only is this cable peculiarly unaffected by winds, being almost non-vibratory, but it is able to stand without injury very high vibration. However, the clamps and fittings are of an entirely new principle in design, imposing minimum strain on a cable for any given vibration.

Lightning Protection

A transmission line on a flat desert is peculiarly exposed to direct hits by lightning. A direct hit on a conductor is likely to burn-off the conductor, and if not, to flash over the insulator string, burn out the insulators and put the line out of service. The usual method of protection is to string a conductor above the power conductors, so that lightning will hit this special conductor which is grounded to the towers and will not hit the power-carrying conductor. On these lines, there are two overhead ground wires supported on elevated ears of the towers, thus completely shielding the conductor from direct lightning hits. This is effective protection if the lightning can get to ground easily; that is, if the ground resistance of the tower is low enough. If this is not the case, the lightning will so raise the voltage of the tower itself that flash-over will occur from the tower to the conductor with great danger of interrupting service. In the case of this line erected in dry sand, the ground resistance is very high. A new solution which has been tried out in the past few years is to bury a cable and attach it to the tower feet so as to lower their ground resistance. In the case of these lines, however, the buried conductor or counterpoise design is unique. Under each of these single circuits there are two buried cables connected to the tower feet, running from end to end of the line, and in addition there is a cross connection between adjacent towers of the two circuits. Each circuit, therefore, consists not of the usual three conductors, but of seven conductors: three hollow copper Type HH conductors that carry the power, two overhead steel conductors (or Copperweld steel in part of the line) to protect against lightning, and two buried copper conductors to lower the ground resistance of the structure. The counterpoise or buried cable alone amounted to 1,250,000 pounds of copper.

The line was so carefully designed, tested and studied by Dr. Scattergood, in collaboration with Stanford University that it may be stated with the greatest confidence that despite the fact that a voltage of 287,000 volts never has been used before, these lines will operate with a degree of freedom from interruption uncommon in low voltage lines.

Scheduled to go into operation within the next few months, this latest feat in the field of electrical engineering now stretches across the desert and mountain terrain of our rapidly developing Western States as a new monument to the pioneering spirit of American engineering and industry.

Rivalry in the Electrical Field

Our purpose in presenting this description of the cable from the manufacturing company, following an account of the Dam construction and the part of modern chemistry in that, has been to demonstrate by practical evidence the gradual but constant progress of economic development and the broad distribution of benefits from it. The contrast between the Pearl Street Edison system of 1882 and any of the large power systems of the present day is very impressive. The brief mention of expert contributors to the development, and the difficulties surmounted, is also impressive. The part of capital, and the rapidity with which the advance of science renders fixed investments obsolete, is something to note, and so is the constant element of competition.

The rivalry in electrical equipment, as in automobiles and other industrial products, is

characteristic of the spirit of progress that animates American business. No industry stands still for very long, and the copper and electrical industries have been making constant strides.

The tendency to integration and consolidation, for the purpose of rendering more complete service and reducing costs, has appeared in the electrical and copper industries as elsewhere. Thus the General Electric Company, itself formed by an advantageous consolidation, found that the sale of electrical equipment often was facilitated by assistance in the financing, hence in time the Electric Bond & Share Company was organized to offer securities to the investment market. And so, also the large producers of copper found it desirable to interest themselves in the distribution of that product into final consumption. Thus it has been that the General Electric Company, the Anaconda Copper Mining Company, the Phelps Dodge Corporation, the American Smelting & Refining Company, the Kennecott Copper Company have manufactured electrical conductors as a means of selling, in one case electrical equipment, and in the others, the copper metal.

In the case of Phelps Dodge the above order has been reversed, for the original partnership of Phelps, Dodge & Company was making brass buttons and kettles in the Naugatuck valley, Connecticut, one hundred years ago, and branched off into copper production and subsidiary enterprises later.

The Anaconda Copper Mining Company has long been the largest mine-producer of copper in the world, and has done its own smelting and refining, partly for economy and partly to be assured of a satisfactory product. With its larger production it has felt the importance of controlling direct outlets into consumption. In 1899 a number of the important manufacturers of copper products in the Naugatuck valley united to form the American Brass Company. Into this company was merged the successor to the Wallace partnership which was one of the earliest producers of rolled copper, although the honor of being first lies between them and Phelps, Dodge & Company. In 1922 Anaconda purchased a controlling interest in American Brass, and about that time, also obtained control of the National Conduit & Cable Company, the first maker of cables. These purchases gave it entrance into all branches of consumption.

In 1899, the American Smelting & Refining Company was organized by a consolidation of numerous smelting and refining companies engaged in treating non-ferrous metals, and also a number of companies using these products in manufacture for the market, among the latter the Baltimore Copper Smelting & Rolling Company, established in 1864. The American Smelting & Refining Company is a large purchaser of metals from its mining customers and was desirous of assured outlets for them. To this end the General Cables Company was organized in 1927, as successor to the Safety Insulating and Wire Company, organized in 1902 and to the Rome Wire Company and others. At the same time the sheet, rod and wire plants of the Baltimore Company, previously owned by the American Smelting & Refining Company, were taken over by General Cables.

The Kennecott Copper Company is younger than the above-named, but by the ownership of mines in Alaska and the acquisition in 1915 of a controlling interest in the Utah Copper Company of the United States and the Braden Copper Mines Company of Chile, and other mining properties, it has become one of the important producers of copper. The Kennecott Copper Company also owns a controlling interest in Chase Companies, Incorporated, which owns all the stock of the Chase Brass & Copper Company and several other manufacturing subsidiaries. The Chase Brass & Copper Company owns mills and a fabricating plant in Waterbury, Conn., which normally employ more than 4,000 men.

There are numerous independent companies manufacturing copper products—in some instances including cables—in addition to the above-named, and competition between the big ones is like that between the big automobile companies. In this connection it may be added that the principal copper producers have maintained for several years, by joint contributions, an independent organization for research and publicity in the development of new uses for copper, to-wit: The Copper and Brass Research Association. The malleable and non-corrosive qualities of copper make it cheaper in the long run for many uses than metals for which the first cost is lower, and all producers have a common interest in making these qualities known. However, the fundamental principle of competition appears in the irrepressible impulse of every member of the Association to improve its own products and enlarge their use, and as a result this joint organization, although still maintained, has been gradually restricted in its activities. The members are prefering to exercise their own initiative, rather than to set up a planning board. The results of this policy are seen in the record of the industry since 1900, as reviewed below.

Developments in Copper Production

Copper has been known since prehistoric times. Some authorities, not fully established, have said there was a bronze age before the age of iron. Anyway it always has been highly valued, and was the monetary standard of the Roman republic 250 years B.C. The first cop-

per mine worked in the United States was in Granby, Connecticut, before the War of Independence, which accounts for the start of copper manufacturing in the Naugatuck valley, which ever since has been the chief seat of the industry. The industry depended upon imports mainly from Chile, until production in the Lake Superior region became sufficient for home consumption. Annual production had risen to 27,000 tons in 1880, and about that time large scale development began in Montana and Arizona, raising the total in 1890 to 130,000 tons and in 1900 to 303,000, placing the country on an export basis.

In view of the achievements in electrical production and transmission, it has seemed desirable to review the developments in copper production in recent years. To Mr. F. H. Brownell, Chairman of the American Smelting & Refining Company, and a thoroughly-informed authority, we are indebted for the following concise and non-technical review of the more important changes since 1900:

Since the beginning of this century, the history of copper has been quite like that of many other industries, viz.: revolutionary inventions of new processes and machinery, development of quantity production, and a general lowering of costs, passed on in part to the consumer and in part to a higher average wage scale.

In underground mining, improvements in type of explosives, in the character of drills, use of power by electricity or compressed air, mechanical shovels, cars run by electricity instead of man or horse power, larger and faster hoists, have all enabled the production more cheaply of larger quantities of original ore from so-called shaft mines.

The development of the porphyry type of open pit mining, treating tonnages low in copper, at first by steam, and at present electric, shovels, has all been a development since 1900.

In the process of milling, there has been an even more miraculous change, caused by the flotation process. This reverses the former method of gravity separation, under which the heavier metals sank and the lighter rock rose. In flotation, because of the addition of minute quantities of various kinds of oil, which themselves have been the result of research and invention, the heavier metals now rise to the top and the lighter rock is drawn off the bottom.

Smelters have many times the capacity of those of former years. The entire system of roasting ores in modern mechanical roasters bears little or no resemblance to the primitive methods of thirty years ago. Electrically operated craneways and motors handle concentrates and molten metal in large quantities. The Cottrell process of electrolytically saving the metals formerly lost up the stack in the fumes of a smelter, and other similar devices, has greatly reduced metal losses in the process.

At the copper refinery, the use of the electrolytic process was developed commercially in this century, producing not only a much better copper, but also a greater saving of by-products.

The cost of producing copper has been decreased, and this on the whole has been passed on to the consumer and to labor. The average price of copper for the 10 years 1906-1915 was 15.53c; for the 10 years 1926-1935, 11.13c. The price at present is 9½c.

Wages in the various branches of the industry today are from 60% to 100% higher, averaging over 80%, than at the beginning of the century; and working hours have been reduced from ten and in many cases twelve, to eight hours per day.

It would be impossible to produce the tonnage of today by the methods of 25 years ago. Reduced costs, made possible by mechanical and metallurgical improvement, have made ore bodies then unworkable now profitable. Not only are more men employed in the industry than 35 years ago, but had it not been for these improvements, it seems probable that fewer men would be now employed than 35 years ago.

While accurate figures are not available, it is a reasonable calculation that were we today to have a price of 12½c as compared with 15⅛ at the beginning of the century, not only would more men be employed at nearly double the wage, but the consuming public would buy their copper for 20% less and the mines make substantially the same profits on capital invested.

Fluctuations of the Copper Industry

The rise of the copper industry in the United States from 1900 on, its share of the world production, and the fluctuations of production and prices caused by influences originating outside of itself, (the World War, inflation, post-war boom and resulting depression) are shown by the following table, which to save space gives annual averages over five year periods, with 1935 included. Prices are for electrolytically refined copper in New York.

The War gave a great stimulus to production and prices, both of which subsided thereafter, of course affecting unfavorably not only employment in the industries, but all related industries, being one feature of the business collapse of 1920-21. In the post-war boom the demand for the metal recovered, employment revived and the industry thus contributed to the "new era of prosperity." In 1928 the demand was such that, with stocks declining, prices moved upward, and consumers covered future needs, bidding the price up in a "runaway market," to a price of 21.3 cents in March, 1929, (a situation very like the "runaway" sugar market in 1920). When the scarcity scare was over, the price started downward, reaching 6.5 in 1931, and early in 1933 touched 5 cents, the lowest price on record. Meantime copper stocks in the hands of producers and consumers reached unprecedented levels, production was practically suspended, the industry was prostrate, and thus contributed to the general depression.

Average Annual Copper Production and Prices by Five-year Periods

(In thousands of short tons)

	U.S.	Other Countries	World	U.S. % of Total	Price, Elect. N.Y.*
1900-1904	338	286	624	54.2	14.0
1905-1909	471	350	821	57.4	16.6
1910-1914	579	450	1029	56.3	14.1
1915-1919	839	546	1385	60.6	23.7
1920-1924	573	515	1088	52.7	14.3
1925-1929	897	881	1778	50.4	14.8
1930-1934	391	955	1346	29.0	8.5
1935	363	1211	1574	23.1	8.8

* cents per lb.

Meantime the future of copper had been further obscured by the development of low-cost copper mines in Canada, Africa and South America, with large prospective production. The domestic situation was aided by a new customs tariff of 4 cents per lb., enacted in June, 1932, and by an agreement to curtail production to 20% of capacity, which has enabled stocks to be worked off; moreover, the output

in 1935 rose 24% above 1934, owing chiefly to the revival of the automobile industry, another example of how "one hand washes the other."

The drop in the country's share of world production was mainly a result of the new low-cost production in other countries. But for the tariff the loss probably would have been greater.

The distribution of the annual production in consumption uses is shown by the following table, compiled by the American Bureau of Metal Statistics:

Electrical Equipment	22%	Buildings	6%
Wire and Cable	35%	Castings	8%
Automobiles	11%	All Other	18%

Electrical Equipment includes such products as generators, motors, electric locomotives, switchboards, light bulbs, etc. Wire and Cable includes, among others, those products made by the wire industry for communication, transmission of power, light in home and office, coils and other equipment for the radio receiving set, and cord attachments for the many household electric appliances. In the Automobile, Building and other trades, copper finds many uses of a mechanical nature, either as pure copper or in alloy forms.

It will be seen that the use of electric current, which began only about 50 years ago, accounts for more than one-half of the copper consumption, another hint to the people who worry about "technological unemployment" to look on the other side.

It is obvious that normally the light and power utilities are a large factor in copper consumption, and the use is almost wholly in construction and for other lasting or semi-durable goods; in other words, the class of uses for which demand falls off rapidly in a depression. This is illustrated by the following table of estimated consumption of refined copper in this country over a 10-year period, based upon 1925 = 100:

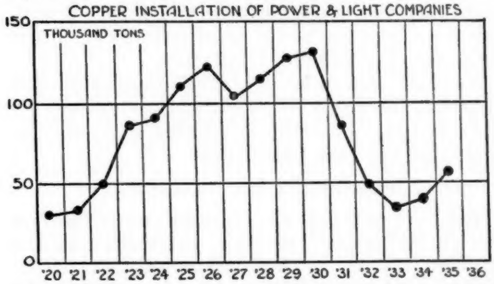
	Elec. Eqpt.	Wire & Cable	Other Domestic	Export	Total
1925	100	100	100	100	100
1926	109	113	107	89	102
1927	101	99	104	95	100
1928	116	117	119	98	110
1929	142	148	128	85	118
1930	120	129	94	61	93
1931	88	78	69	42	63
1932	49	40	45	23	36
1933	49	39	63	26	41
1934	55	41	72	55	56
1935	70	49	87	54	63

This table shows that copper consumption in this country reached its low point in 1932, and then regained through 1934 about one half its losses, which was bettered in 1935, although figures are not available. Normally this country's copper industry has looked to the export market for a demand equal to about 35% of its product.

It is pertinent to recall in this connection the statement made in a previous article of this series, that the average charge for electric current for domestic use by the public utilities of the United States declined 38% from 1913 to 1934, although the average wage of public utility employes increased about 150%. And not only has the price of current declined, but the cost is further reduced by improvements in the facilities for using it; for example, the General Electric Company has recently announced another reduction in the price of its Mazda lamps. The 300-watt Mazda lamp, as an instance, now gives 13% more light than in 1921 and its price is 76% lower.

The use of copper showing the greatest decline is that in wires and cables, mainly by the light and power companies, and is largely attributable to the general depression, which checked the growing need for additional facilities, but also to other uncertainties more peculiar to itself.

The following curve, showing the estimated tonnage of copper consumed by power and light companies since 1920, presents graphically the loss sustained by the copper industry in one of its principal markets:



1920	29,600	1925	110,000	1930	130,000
1921	33,100	1926	122,000	1931	85,000
1922	48,800	1927	103,000	1932	49,000
1923	85,800	1928	115,000	1933	33,000
1924	90,000	1929	127,000	1934	40,000
				1935	55,500

Specialization in Industry

The above described developments afford a striking illustration of the gains resulting from the system of specialization in learning and industry which enables individuals in different lines of work to concentrate their efforts effectively, for the common good. Credit for the progress shown belongs not only to the immediate participants for their personal achievements, but to the Economic System as a whole —all its branches, divisions and subdivisions— in every field of learning. All are necessary to each other and tend to advance together.

Economic society is a vast net-work of intimate, mutually beneficial, relations, constantly adjustable to the advance of learning and the changing wants of the people.

The Influence of War

The fluctuations in copper production, consumption and prices, illustrate the effects throughout the economic system of influences originating outside of itself, in this case the influence of War upon the economic equilibrium, so necessary to normal relations between all parts. The entire system of specialization and exchange is dependent upon the equilibrium. Wars always have been followed by

economic disorganization and business depression, and not only was the World War the greatest of all disturbances, but it struck the economic system at its highest development of specialization and interdependence.

War is no part of the normal activities of industry and trade; and the principles of the economic system have no responsibility for War. The economic system is based upon mutually advantageous cooperation in production and the exchanges, while War is a violation of all economic law.

The disturbances in the copper industry are an example of what occurred in many other industries, and among the most important, as in agriculture, the coal industry, the textiles, construction, and manufactures generally. Trade relations were disrupted and confusion resulted, both domestically and around the world, by the abnormal rise and fall of prices, and the vast increase of indebtedness resulting from the war-produced inflation.

Against the view that the depression has resulted from the disorganization caused by War is the view that attributes it to the increase of machine production.

Release of Farm Population

We have stressed the significance of the fact that in about 100 years the proportion of the farm population to the total population of the United States has fallen from three-fourths to less than one-fourth. This is as though, of a family of 12 working members, 9 were formerly required to give all of their time to providing food and clothing materials, leaving only 3 to provide all of the other things for which they might have "wants"; and then this situation is completely reversed, with only 3 required to produce food and clothing materials, while the number free to serve the family in other ways is *tripled*. Apply this change to the whole population and we see the fruits of the economic revolution of the last 100 years. But we will hardly appreciate the gains unless we can imagine 127,000,000 people in this country striving to satisfy their wants with the industrial equipment of 100 years ago!

This release of population from agriculture for the development of other industries and services has made possible the economic and social changes of that period. The new contributions have lightened the hard toil of agriculture, increased the comforts and relieved the monotony of farm life as it was, and have established for millions of people a standard of living that even the few and mighty never had known before, in all the history of mankind.

The March number told of the new Chemurgic Council, composed of the leading chemical industries, which proposes to remedy the agricultural situation by increasing its output of non-food products, to establish a balanced relation with the other employments and increase the prosperity of all. Undoubtedly this is sound reasoning.

The entire movement from the farms to the other industries has been in response to the new demands for labor, and indeed was necessary to the development of the new employments. Now the need is for stability and cooperation There is plenty of work for all. There can be no limit upon the amount of useful employment to be had by exchanging services, until the entire population has everything it wants; *provided* that the exchanges are kept in balance.

The Coal Industry

Coal-mining, like farming, has been a relatively diminishing industry. Both are engaged in converting natural resources to the service of a population which is increasing more slowly than formerly, and the increasing efficiency of both industries has required a constantly diminishing proportion of the population to operate them. In all countries the coal industry is in a state of prostration with a large surplus of miners, and it is doubtful that full employment for former numbers will again be possible, partly because other fuels and sources of power are competing with coal, partly because coal is being mined to an increasing extent by machinery, and, finally, because every new power plant installed generates an increasing amount of power from each ton of coal consumed.* Here is a situation very like that which has existed in agriculture, and thus far has been met by the transfer of labor to other industries.

The coal industry appealed to Congress, and taking counsel of despair, Congress attempted to relieve the situation by passing the Guffey Act. This was planned to provide a strict system of regulation, by dividing the coal business on a quota basis, raising wages and prices and eliminating competition between mines and between miners. The 30 hour week has been suggested for miners, weekly pay to be as high as formerly, and prices high enough to afford a living profit to average mines, even on a low volume basis.

Obviously this policy would have the effect of "freezing" all the uneconomical conditions that have developed in the coal industry as a result of War and industrial disorganization, and of making them permanent,—including surplus mines and surplus miners—and by "taking care" of everything at the cost of the other industries and the entire consuming public. It

* Note: Sir Frank Edward Smith, K.C.B., an eminent British authority, in a presidental address, delivered to a society of engineers, of which he had been chosen the official head, in London, December 13, 1935, stated that the weights of coal required to generate 1 million units of electricity in 1913 and in 1934 were as follows: 1913, 1,083 tons; in 1934, 661 tons. Moreover, he said that these were average figures of existing plants, and signified "a thermal efficiency of 29 per cent," and that "some power stations have much greater efficiency than the average." United States Census figures are similar.

would alter the exchange relations between the coal industry and all other industries from what they have been in the past, compelling the others to give more of their products for coal, thus necessarily reducing the consumption of other products and eventually of coal itself. In short, it would reduce the aggregate consumption of products, the volume of the exchanges and the standard of living, to take care of the coal industry, and would fail to do that. The public would pay more for a reduced production of coal and for shorter working time, and to do so must surely buy less of other things. The wastes of any such system must far exceed the gains to the beneficiaries. Prosperity cannot be restored by increasing waste.

Other Industries in Line

Furthermore, other lines of industry have been much interested in the Guffey Act, and a similar plan has been embodied in the Ellenbogen bill to organize the cotton goods industry in like manner, and the bill has been favorably reported by a House Committee. The railroad brotherhoods have announced their demand for the 30-hour week, pay to remain the same, and have compromised with the companies on a "dismissal wage," when services are no longer needed. The American Federation of Labor has declared for the 30-hour week throughout industry, with money wages to rise with living costs, which naturally will rise further as wages do. The argument for this general policy is that technological unemployment exists and that work must be "shared" by all, with higher pay-rates to compensate for the shorter time that must result from the constant decline of consumption, as these arrangements come into effect upon the luckless people outside of them.

Moreover, agriculture now is wanting to be provided for by a similar arrangement (i.e., a guaranteed minimum income) that will relieve the pressure which has caused the movement of labor from the farms to the cities. This suggests that the "dismissal wage" idea may be somehow applied to ease the transfer of farm boys to the cities when the equilibrium requires it.

All of this suggests reflection upon how long it will take before all of the population is gathered into this plan, by which each group shall fix its own compensation, at the expense of the other groups; also what will be the fate of that portion of the population which is not fortunate enough to be admitted to any group; and, finally, when all are "cared for" at the expense of each other, how much better off will any one be, in view of the fact that all are planning to restrict working time and production as the means of getting higher wages or prices.

The logic of the policy is, that the development of industry and increase of production in all lines which has been going on throughout the past, shall be stopped, and that we shall be content in the future to divide the product of present capacity, reducing the operating time of the industries to nullify any future gains in knowledge and capacity.

The Supreme Court Decision

At this stage, however, the Supreme Court of the United States holds the Guffey Act unconstitutional, which stops the whole movement headed by the coal industry. The Court decides that our liberty-loving forefathers, who founded this Government as a Union of States, declined to give such sweeping powers to the Federal Government—a conclusion that seems quite in keeping with all previous information about them. Therefore, legislation, like the original Guffey Act will have to wait on an amendment to the Constitution, and the people will have plenty of time to consider whether or not they want to amend it for that purpose.

The decision of the Court is that the power to enact such legislation was not granted by the States, and the statement may be added that many of the States have Constitutions which do not allow such power even to the State governments: hence there is little probability of such legislation by the States.

Previous Supreme Court decisions have held that the operation of a fixed business, like a coal mine or a factory, is not in itself interstate commerce; but this one while reaffirming that principle, is silent on the right to regulate prices affecting interstate business. A new bill is proposed by the Guffey supporters, limited to this scope, but containing the coercive feature that is repugnant to the "bill of rights." Moreover, the fundamental question remains unchanged. Do we want to stop industrial progress, in the face of all it has accomplished, and despite the assurance which the past affords that industrial and social progress in the future will be more rapid than ever heretofore? Inevitably the question arises, "Would the workers of this country rather have more leisure time, or more of the products of the industries?"

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